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B8R

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(54) Automatic printer margin setting device

(57) The device locates the left and right edge positions in relation to the reference position, of the recording paper set on the platen, identifies the paper size and automatically set specified left and right margins according to the obtained edge position and paper size information. The control circuit comprises a main CPU 11 into which print data is input from keyboard 12, carriage CPU 13 connected to 11 for controlling carriage drive motor 15 through drive circuit 14 and for receiving signals output from home position detector 16 when the carriage 2 moves to the home position. The carriage CPU 13 also receives signals from paper detecting means 17 and paper edge detection signals from optical means 9 mounted on the carriage. Carriage CPU 13 contains a counter N and a RAM (areas M1,M2 for storing the count when the paper left and right edges are detected respectively). ROM table 18 for storing width data and the corresponding left and right margin data for each paper size (e.g. A3,A4,B4,B5), and format memory 19 for retaining left and right margin data are connected to main CPU 11.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

1/2

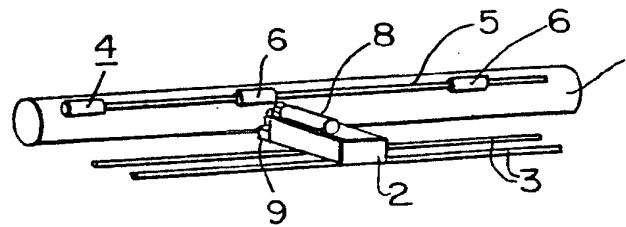


FIG. 1.

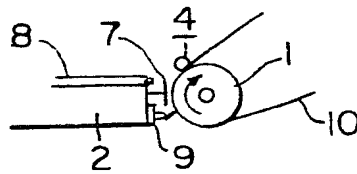
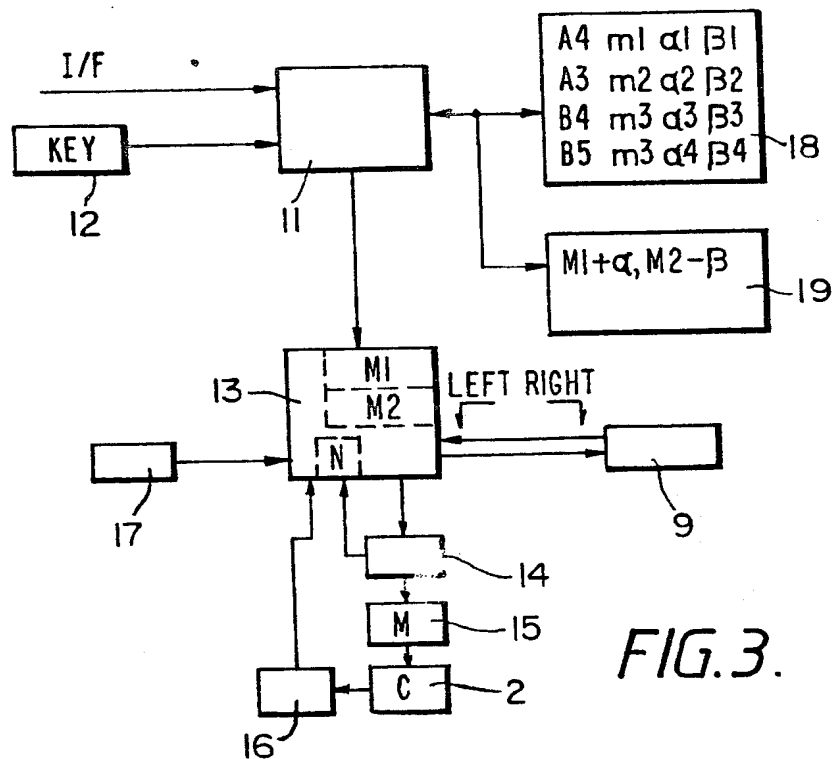


FIG. 2.



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graph TD
    subgraph Carriage_CPU [CARRIAGE CPU]
        A[INSERT PAPER] --> B{PAPER SET?}
        B -- N --> A
        B -- Y --> C[CARRIAGE MOVES TO LEFT LIMIT]
        C --> D[CARRIAGE MOVES TO RIGHT  
COUNTER N STARTS COUNTING]
        D --> E{LEFT EDGE?}
        E -- N --> D
        E -- Y --> F[COUNT BY COUNTER N IS INPUT INTO M1]
        F --> G{RIGHT EDGE?}
        G -- N --> D
        G -- Y --> H[COUNT BY COUNTER N IS INPUT INTO M2]
        H --> I[CARRIAGE RETURNS]
        I --> J{HOME POSITION?}
        J -- N --> D
        J -- Y --> K[CARRIAGE STOPS]
    end

    subgraph Main_CPU [MAIN CPU]
        L["m" RECEIVED] --> M[PAPER SIZE IS DETERMINED]
        M --> N[LEFT AND RIGHT MARGIN DATA α, β ARE READ OUT]
        N --> O[TRANSFER TO W-CPU]
    end

    O --> P[RECEIVED]
    P --> Q[OPERATION FOR M1 + α AND M2 + β]
    Q --> R[MARGIN SETTING]

    R --> S[OPERATION FOR M2 - M1 = m]
    S --> T["m" IS TRANSFERRED]
    T --> D

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SPECIFICATION

Automatic margin setting device

5 Background of the Invention

The present invention relates to a device for automatically setting right and left margins of the paper inserted and set on the platen of a printer including a typewriter.

- 10 Generally in a printer such as a typewriter, it is necessary to insert and set a paper accurately at a predetermined position (left edge positioning), which is quite troublesome. It is also required to set left and right margins manually according to the paper size (such as A4, B5, B4, etc.).

The operator is thus required to position the paper and designate a desired line format manually.

20 Summary of the Invention

An object of the present invention is to provide an automatic margin setting device of a printer such as a typewriter which automatically sets left and right margins of the paper set in place on the printer platen.

- 25 Another object of the present invention is to provide an automatic margin setting device of a printer which locates left and right edge positions in relation to the reference position, of a paper set on the platen, identifies the paper size, and automatically sets left and right margins according to the obtained edge position and paper size data, thus realizing a printer which does not require accurate paper positioning (left edge positioning) and manual paper margin setting operations and therefore is simple in preparatory operation.

- 30 Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only; various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

- 35 Briefly described, in accordance with the present invention, an automatic margin setting device comprises: optical scanning means mounted facing the platen and movable along the platen to detect left and right edges of the paper set on the platen; first memory means for storing the edge position data obtained by the optical scanning means, in relation to the reference position; second memory means in which left and right margin data have been preliminarily stored for each of various paper sizes (B4, B5, A4, etc.); control means for identifying the paper size on the basis of the edge position data stored in the first memory means and reading the corresponding margin data from the second mem-

- ory means; and operation means for calculating left and right margin values for the paper based on the margin data read from the second memory means and the edge position data stored in the first memory means, whereby the left and right paper margins are set according to the left and right margin values calculated by the operation means.

75 Brief Description of the Drawings

- The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

Fig. 1 is a perspective view of the essential part of a printer related to the present invention;

Fig. 2 is a sectional view of the essential part of Fig. 1;

Fig. 3 is a block diagram of the control circuit of the printer of Fig. 1; and

Fig. 4 is a flow chart for explaining the operation of the printer related to the present invention.

Detailed Description of the Invention

- Fig. 1 is a perspective view of the essential part of a printer related to the present invention, and Fig. 2 is a sectional view of the essential part of Fig. 1.

Referring to these figures, a platen 1 is connected to a rotary mechanism. A carriage 2 facing the platen 1 reciprocates on supporting shafts 3, 3 axially along the platen 1. A paper holder 4 comprises a plurality of holding rollers 6, 6 on a shaft 5 parallel with the platen 1, the rollers 6, 6 being rotatable and slidable along the shaft 5.

The carriage 2 has a rotary wheel 7 with types, hammer means 8 for pushing a selected type positioned at the printing position toward the paper, and optical means 9 on the front facing the platen 1. The optical means 9 comprises light emitting and sensing elements.

As the carriage 2 moves along the platen 1, the optical means 9 optically scans the front face of the platen 1, detecting the left and right edges of the paper 10 set on the platen 1.

Fig. 3 is a block diagram of the control circuit of the printer with the automatic margin setting device of the present invention. 11 is the printer's main CPU into which print data is input from a keyboard 12 or via an interface I/F from an external device. 13 is a carriage CPU which is connected to the main CPU 11, and controls the carriage movement. The carriage CPU 13 not only controls a carriage drive motor 15 through a carriage drive circuit 14 but also receives signals output from home position detecting means 16 when the carriage 2 moves to the home (reference) position.

The carriage CPU 13 also receives signals from paper detecting means 17 which detects the paper 10 set on the platen 1 and paper edge detection signals from the optical means 9. The carriage CPU 13 contains a counter N and a RAM (M1, M2).

18 is a ROM table storing width data m_1, m_2, \dots and the corresponding left and right margin data $\alpha_1, \beta_1, \alpha_2, \beta_2, \dots$ for each paper size (such as A4, B4, B5, etc.). 19 is a format memory for retaining the left and right margin data of the paper set on the platen 1. The ROM table 18 and the format memory 19 are connected to the main CPU 11.

Now, the operation of the control circuit of Fig. 3 is described with reference to the flow chart of Fig. 4.

When a recording paper is set manually or automatically in the printer, the detecting means 17 detects the paper, and outputs a signal for instructing the carriage CPU 13 to move the carriage 2 to the left. The carriage CPU 13 controls the carriage drive circuit 14 to rotate the motor 15, so that the carriage 2 is shifted to its mechanical home position. When the home position detecting means 16 detects the carriage at the home position, the carriage CPU 13 gives an instruction to the carriage drive circuit 14 to move the carriage 2 to the right as well as an instruction to actuate the optical means 9.

Simultaneously, the counter N of the carriage CPU 13 starts counting the carriage forwarding signals.

When the optical means 9 detects the paper left edge during the rightward travel of the carriage 2, the detection signal is input into the carriage CPU 13 so that the count by the counter N at that time is stored in the area M1 of the RAM. When the paper right edge is detected by the optical means 9, the carriage CPU 13 stores the count by the counter N at that time in the area M2 of the RAM. Simultaneously, the carriage CPU 13 gives an instruction to the carriage drive circuit 14 to return the carriage 2 to its home position.

The carriage CPU 13 then carries out operation of $M_2 - M_1$ on the basis of the data stored in the areas M1 and M2 and transfers the operation result "m" to the main CPU 11.

On receiving the operation result "m", the main CPU 11 refers to the paper size data preliminarily stored in the ROM table 18, to identify the size of the paper presently set in the printer and read the corresponding left and right margin values α and β which are then transferred to the carriage CPU 13.

On receiving the left and right margin values α and β , the carriage CPU 13 conducts operations of $M_1 + \alpha$ and $M_2 - \beta$, using the data stored in the areas M1 and M2. The operation results are input through the main CPU 11 in the format memory 19. The left and right margin data are thus set in the format memory 19. printing operation is conducted on the

paper in accordance with the thus set format.

In the above embodiment, the operations for left and right margins are conducted in the carriage CPU 13. Alternatively, they may be conducted in the main CPU 11.

According to the present invention, as described above, when a recording paper is set on the platen, the left and right edges of the paper are detected by the optical means which scans the platen front face, and the left and right paper margins are automatically set according to the above detected edge data, prior to the printing operation. Therefore, the printer equipped with the automatic margin setting device of the present invention does not require accurate paper positioning (left edge positioning) nor manual left and right margin setting operations. Thus, the present invention can realize a convenient printer which is simple in preparatory operation.

The printer related to the present invention is of the type in which data is printed out on the recording paper set on the platen, and includes a typewriter, ink jet printer, etc.

While only certain embodiments of the present invention have been described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit and scope of the present invention as claimed.

CLAIMS

1. An automatic printer margin setting device which locates the left and right edge positions in relation to the reference position, of the recording paper set on the platen, identifies the paper size and automatically set specified left and right margins according to the obtained edge position and paper size data.

2. An automatic margin setting device comprising: means for detecting the paper position inserted on the platen; means for storing margin data corresponding to each of various paper sizes; means for determining the paper size based on the information from said paper position detecting means; means for reading the appropriate margin data from said margin data memory means according to the information from said paper size determining means; and means for determining the margins of the paper set on the platen according to the information from said margin data reading means and said paper position detecting means.

3. An automatic margin setting device, comprising: optical scanning means mounted facing the platen and movable along the platen to detect the left and right edges of the paper set on the platen; first memory means for storing the paper edge position data obtained by said optical scanning means in relation to the reference position; second memory means in which left and right margin data have been preliminarily stored for each of various paper sizes; control means for determining the paper size on the basis of the left and right edge

position data stored in said first memory means and for reading the corresponding left and right margin data from said second memory means; and operation means for calculating the left and right margin values for the paper, using the left and right margin data read from said second memory means and the left and right edge position data stored in said first memory means, whereby the left and right paper margins are set according to the left and right margin values calculated by said operation means.

4. Apparatus for automatically determining a margin or margins to be left when printing on a sheet recording member, the apparatus comprising means for detecting the position of an edge of said recording member adjacent which a said margin is to be left, means for establishing the size of said recording member, and means for automatically determining the position and width of the required margin at said edge in accordance with said detected position and said established size.

5. Apparatus according to claim 4 wherein said detecting means is operable to detect the positions of both the left and right edges of the recording member with respect to a reference position, and wherein said establishing means determines said size automatically in accordance with the detected edge positions.

6. An automatic margin setting device substantially as hereinbefore described with reference to the accompanying drawings.

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